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EXAMINER	
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ART UNIT	PAPER NUMBER
2133	

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8

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/976,729	DOHMEN ET AL.	
	Examiner	Art Unit	
	Joseph D. Torres	2133	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 April 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-25* is/are pending in the application.

4a) Of the above claim(s) *15-18 and 20-24* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,6,8-14, 19 and 25* is/are rejected.

7)☒ Claim(s) *5 and 7* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *7*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of Group I in Paper No. 5 is acknowledged. The traversal is on the ground(s) that "The Examiner has stated that the three Groups are each in class 714, and that subclasses 785, '757, and 776 are the respective subclasses for the Groups"..."Therefore, the Examiner would not be overly burdened by searching these groups, as there are only three subclasses of a single class to search". This is not found persuasive because 714/785 is only the class where Group I must be classified. The search for Group I included 714/785, 714/784, 714/782 and 714/781, which consists of 1382 patents. The Examiner would also like to point out a word search on "syndrome and error adj correction" produces 3759 patents. A search for Group II and Group III would require a search in various subclasses throughout class 714 and 375. An initial word search for "parity with parallel" produces 2410 documents. Finally, the Examiner would like to point out that the parallel encoders claimed in Group II and Group III are non-obvious from the decoder of Group I and each of the details of the encoders in Groups II and III must be found separately, hence the restriction is proper. The Examiner asserts that examining Groups II and III would require from the Examiner the equivalent work of examining two separate patents.

The requirement is still deemed proper and is therefore made FINAL.

This application contains claims 15-18 and 20-24 drawn to an invention nonelected with traverse in Paper No. 5. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

Information Disclosure Statement

2. The Examiner acknowledges receipt of the requested copy of the Mastrovito paper in the IDS of Paper No. 7.

Drawings

3. In view of the drawing corrections of Amendment A in Paper No. 6, the Examiner withdraws all objections to the drawings.

The drawings were received on 19 April 2004. These drawings are accepted.

Claim Objections in the Prior Office Action

4. In view of the Applicant's clarification of claim language that was objected to in Amendment A of Paper No. 6, the Examiner withdraws all previous objections to the claims.

35 USC § 112 Claim Rejections in the Prior Office Action

5. In view of the Applicant's clarification of claim language that was rejected under 35 USC § 112, second paragraph, in Amendment A of Paper No. 6, the Examiner withdraws all previous 35 USC § 112 rejections to the claims.

Response to Amendment

6. Applicant's arguments filed 19 April 2004 have been fully considered but they are not persuasive.

The Applicant contends (on page 13 of the Applicant's response in Paper No. 6), "Chen does not disclose or imply an N-parallel syndrome generator that is adapted to perform a calculation each cycle with N symbols from the parallel data stream, as claimed in independent claim 1". More explicitly the Applicant contends that Chen does not teach newly amended claim language in claim 1. "a plurality of N-parallel syndrome generators, each of the N-parallel syndrome generators coupled to a parallel data stream and being adapted to perform a calculation each cycle with N symbols from the parallel data stream, each N-parallel syndrome generator adapted to determine, after a predetermined number of cycles, a plurality of syndromes; a plurality of syndromes, a plurality of key equation determination devices, each key equation determination device coupled to at least one of the N-parallel syndrome generators and being adapted to determine at least one error polynomial by using a corresponding plurality of syndromes from the at least one N-parallel s mdrome generator" (Note: the underlined language in the claim denotes newly added language to amended claim 1).

The Examiner disagrees and asserts that Chen teaches a decoder comprising: a plurality of N-parallel syndrome generators (in Figure 6 of Chen, the Syndrome Generators S_1-S_{2t} can be grouped in twos $[S_1, S_2]$, $[S_3, S_4]$... $[S_{2t-1}, S_{2t}]$ whereby each of

the [S_{2k-1}, S_{2k}], as k ranges from 1 to t, is an N=2-parallel syndrome generator; hence Chen teaches t N=2-parallel syndrome generators), each of the N-parallel syndrome generators coupled to a parallel data stream and being adapted to perform a calculation each cycle with N symbols from the parallel data stream (each of the N=2-parallel syndrome generators in Figure 6 of Chen is coupled to a parallel data stream corresponding to 2 input symbols for each N=2-parallel syndrome generator and is adapted to perform a calculation each Syndrome cycle with the N=2 symbols from the parallel data stream), each N-parallel syndrome generator adapted to determine, after a predetermined number of cycles, a plurality of syndromes (each N=2-parallel syndrome generator in Figure 6 of Chen is used to determine, after a predetermined syndrome cycle, N=2 syndromes), a plurality of key equation determination devices (in Figure 6 of Chen, the key equation determination devices f_0-f_{2t} can be grouped in twos, [f_1, f_2], [f_3, f_4]... [f_{2t-1}, f_{2t}], whereby each of the [f_{2k-1}, f_{2k}], as k ranges from 1 to t, is a key equation determination device, see col. 9, lines 10-14 in Chen), each key equation determination device coupled to at least one of the N-parallel syndrome generators and being adapted to determine at least one error polynomial by using a corresponding plurality of syndromes from the at least one N-parallel syndrome generators (Figure 6 of Chen teaches that each key equation determination device [f_{2k-1}, f_{2k}], as k ranges from 1 to t, coupled to at least one of the corresponding N=2-parallel syndrome generators [S_{2k-1}, S_{2k}], as k ranges from 1 to t, and is adapted to determine at least one error polynomial by using a corresponding plurality of syndromes from the at least one N-parallel syndrome generator [S_{2k-1}, S_{2k}]; Note: col. 9, lines 10-14 in Chen teach that each key

equation determination device [f_{2k-1}, f_{2k}] generates error locator and error value polynomials). Note: although the Examiner is not changing the grounds of rejection, the Examiner has rewritten the rejection to claim 1, below, to clarify the rejection and to incorporate the newly amended language of independent claim 1 into the previous rejections of claims 1-14.

The Examiner asserts that on page 14 of the Applicant's response in Paper No. 6, the Applicant repeats the same argument for claims 2-14 and 19 saying that the combination of White and Chen to not teach the limitations of claim 1 as cited in the previous paragraph.

The Examiner disagrees and asserts that Chen teaches decoder comprising: a plurality of N-parallel syndrome generators (in Figure 6 of Chen, the Syndrome Generators S_1-S_{2t} can be grouped in twos [S_1, S_2], [S_3, S_4]... [S_{2t-1}, S_{2t}] whereby each of the [S_{2k-1}, S_{2k}], as k ranges from 1 to t, is an N=2-parallel syndrome generator; hence Chen teaches t N=2-parallel syndrome generators), each of the N-parallel syndrome generators coupled to a parallel data stream and being adapted to perform a calculation each cycle with N symbols from the parallel data stream (each of the N=2-parallel syndrome generators in Figure 6 of Chen is coupled to a parallel data stream corresponding to 2 input symbols for each N=2-parallel syndrome generator and is adapted to perform a calculation each Syndrome cycle with the N=2 symbols from the parallel data stream), each N-parallel syndrome generator adapted to determine, after a predetermined number of cycles, a plurality of syndromes (each N=2-parallel syndrome generator in

Figure 6 of Chen is used to determine, after a predetermined syndrome cycle, N=2 syndromes), a plurality of key equation determination devices (in Figure 6 of Chen, the key equation determination devices f_0-f_{2t} can be grouped in twos, $[f_1, f_2]$, $[f_3, f_4]$... $[f_{2t-1}, f_{2t}]$, whereby each of the $[f_{2k-1}, f_{2k}]$, as k ranges from 1 to t, is a key equation determination device, see col. 9, lines 10-14 in Chen), each key equation determination device coupled to at least one of the N-parallel syndrome generators and being adapted to determine at least one error polynomial by using a corresponding plurality of syndromes from the at least one N-parallel syndrome generators (Figure 6 of Chen teaches that each key equation determination device $[f_{2k-1}, f_{2k}]$, as k ranges from 1 to t, coupled to at least one of the corresponding N=2-parallel syndrome generators $[S_{2k-1}, S_{2k}]$, as k ranges from 1 to t, and is adapted to determine at least one error polynomial by using a corresponding plurality of syndromes from the at least one N-parallel syndrome generator $[S_{2k-1}, S_{2k}]$; Note: col. 9, lines 10-14 in Chen teach that each key equation determination device $[f_{2k-1}, f_{2k}]$ generates error locator and error value polynomials). Note: although the Examiner is not changing the grounds of rejection, the Examiner has rewritten the rejections to the claims, below, to clarify the rejection and to incorporate the newly amended language of the independent claims into the previous rejections of claims 1-14 and 19.

The Applicant contends (on page 15 of the Applicant's response in Paper No. 6), that Chen does not teach newly amended language in claim 19: "performing a plurality of N-Parallel syndrome generations using the parallel data stream, each of the N parallel

syndrome generations determining, after a predetermined number of cycles, a plurality of syndromes; performing, in parallel and by using each of the plurality of syndromes generated by each of the plurality of N-parallel syndrome generations, a plurality of N-parallel decodings of the parallel data stream to determine, in parallel, a plurality of error value and error locator polynomials".

The Examiner disagrees and asserts that Chen teaches a method comprising the steps of: converting a serial input data stream into a parallel data stream (col. 2, lines 45-50 in Chen teach the input to the syndrome generator is a serial input and Figure 6 of Chen teaches that the serial input is converted to a parallel data stream); performing a plurality of N-Parallel syndrome generations using the parallel data stream, each of the N parallel syndrome generations determining, after a predetermined number of cycles, a plurality of syndromes (in Figure 6 of Chen, the Syndrome Generators S_0-S_{2t} can be grouped in twos $[S_1, S_2]$, $[S_3, S_4]$... $[S_{2t-1}, S_{2t}]$ whereby each of the $[S_{2k-1}, S_{2k}]$, as k ranges from 1 to t, is an N=2-parallel syndrome generator; hence Chen teaches t N=2-parallel syndrome generators; each of the N=2-parallel syndrome generators in Figure 6 of Chen is coupled to the parallel data stream corresponding to 2 input symbols for each N=2-parallel syndrome generator and is adapted to perform a calculation each Syndrome cycle with the N=2 symbols from the parallel data stream; each N=2-parallel syndrome generator in Figure 6 of Chen is used to determine, after a predetermined syndrome cycle, N=2 syndromes); performing, in parallel and by using each of the plurality of syndromes generated by each of the plurality of N-parallel syndrome generations, a plurality of N-parallel decodings of the parallel data stream to

determine, in parallel, a plurality of error value and error locator polynomials (in Figure 6 of Chen, the key equation determination devices f_0-f_{2t} can be grouped in twos $[f_1, f_2]$, $[f_3, f_4]$... $[f_{2t-1}, f_{2t}]$ whereby each of the $[f_{2k-1}, f_{2k}]$, as k ranges from 1 to t, is a key equation determination device, see col. 9, lines 10-14 in Chen; Figure 6 of Chen teaches that each key equation determination device $[f_{2k-1}, f_{2k}]$, as k ranges from 1 to t, coupled to at least one of the corresponding N=2-parallel syndrome generators, $[S_{2k-1}, S_{2k}]$, as k ranges from 1 to t, and is adapted to determine at least one error polynomial by decoding a corresponding plurality of syndromes from the at least one N-parallel syndrome generator $[S_{2k-1}, S_{2k}]$; Note: col. 9, lines 10-14 in Chen teach that each key equation determination device $[f_{2k-1}, f_{2k}]$ generates error locator and error value polynomials). Note: although the Examiner is not changing the grounds of rejection, the Examiner has rewritten the rejection to claim 19, below, to clarify the rejection and to incorporate the newly amended language of independent claim 19 into the previous rejection of claim 19.

The Examiner disagrees with the Applicants and maintains all rejections of amended claims 1 and 19 and previously examined claims 2-14. All amendments and arguments by the applicant have been considered. It is the Examiner's conclusion that amended claims 1 and 19 and previously examined claims 2-14 are not patentably distinct or non-obvious over the prior art of record in view of the reference, Chen, Yen-Hao (US 6571368 B1), Yun, Young-Han (US 5526368 A), White, Philip E. (US 5754563 A) and

Mastrovito, as currently applied in the previous Office Action of Paper No. 5 and as rewritten in the current Office Action. Therefore, the rejection is maintained.

Note: although the Examiner is not changing the grounds of rejection, the Examiner has rewritten the rejections to claims 1 and 19, below, to clarify the rejections and to incorporate the newly amended language of independent claims 1 and 19 into the previous rejections of claims 1-14 and 19.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 1-3 and 25 are rejected under 35 U.S.C. 102(e) as being anticipated by Chen, Yen-Hao (US 6571368 B1).

35 U.S.C. 102(e) rejection of claim 1.

Chen teaches a decoder comprising: a plurality of N-parallel syndrome generators (in Figure 6 of Chen, the Syndrome Generators S_0-S_{2t} can be grouped in twos $[S_1, S_2]$, $[S_3, S_4]$... $[S_{2t-1}, S_{2t}]$ whereby each of the $[S_{2k-1}, S_{2k}]$, as k ranges from 1 to t, is an N=2-parallel syndrome generator; hence Chen teaches t N=2-parallel syndrome

generators), each of the N-parallel syndrome generators coupled to a parallel data stream and being adapted to perform a calculation each cycle with N symbols from the parallel data stream (each of the N=2-parallel syndrome generators in Figure 6 of Chen is coupled to a parallel data stream corresponding to 2 input symbols for each N=2-parallel syndrome generator and is adapted to perform a calculation each Syndrome cycle with the N=2 symbols from the parallel data stream), each N-parallel syndrome generator adapted to determine, after a predetermined number of cycles, a plurality of syndromes (each N=2-parallel syndrome generator in Figure 6 of Chen is used to determine, after a predetermined syndrome cycle, N=2 syndromes), a plurality of key equation determination devices (in Figure 6 of Chen, the key equation determination devices f_0-f_{2t} can be grouped in twos $[f_1, f_2]$, $[f_3, f_4]$... $[f_{2t-1}, f_{2t}]$ whereby each of the $[f_{2k-1}, f_{2k}]$, as k ranges from 1 to t, is a key equation determination device, see col. 9, lines 10-14 in Chen), each key equation determination device coupled to at least one of the N-parallel syndrome generators and being adapted to determine at least one error polynomial by using a corresponding plurality of syndromes from the at least one N-parallel syndrome generators (Figure 6 of Chen teaches that each key equation determination device $[f_{2k-1}, f_{2k}]$, as k ranges from 1 to t, coupled to at least one of the corresponding N=2-parallel syndrome generators, $[S_{2k-1}, S_{2k}]$, as k ranges from 1 to t, and is adapted to determine at least one error polynomial by using a corresponding plurality of syndromes from the at least one N-parallel syndrome generator $[S_{2k-1}, S_{2k}]$; Note: col. 9, lines 10-14 in Chen teach that each key equation determination device $[f_{2k-1}, f_{2k}]$ generates error locator and error value polynomials) and a plurality of N-parallel

error determination and correcting devices, one for each of the N-parallel syndrome generators, each N-parallel error correction and determination device coupled to one of the key equation determination devices and being adapted to use the at least one error polynomial produced by the one key equation determination device to correct errors in the parallel data stream (in Figure 6 of Chen, row E:G, H and Ω_Λ can be grouped in twos, $\{[g_1, g_2], [h_1, h_2], [\omega_1, \omega_2]\}$, $\{[g_3, g_4], [h_3, h_4], [\omega_3, \omega_4]\}\ldots \{[g_{2t-1}, g_{2t}], [h_{2t-1}, h_{2t}], [\omega_{2t-1}, \omega_{2t}]\}$, whereby each of the $\{[g_{2k-1}, g_{2k}], [h_{2k-1}, h_{2k}], [\omega_{2k-1}, \omega_{2k}]\}$, as k ranges from 1 to t, is an N=2-parallel syndrome generator; hence Chen teaches t N=2-parallel error determination and correcting devices, one for each of the N-parallel syndrome generators, $[S_1, S_2], [S_3, S_4]\ldots [S_{2t-1}, S_{2t}]$, each N-parallel error correction and determination devices $\{[g_1, g_2], [h_1, h_2], [\omega_1, \omega_2]\}$, $\{[g_3, g_4], [h_3, h_4], [\omega_3, \omega_4]\}\ldots \{[g_{2t-1}, g_{2t}], [h_{2t-1}, h_{2t}], [\omega_{2t-1}, \omega_{2t}]\}$ coupled to one of the key equation determination devices, $[f_1, f_2], [f_3, f_4]\ldots [f_{2t-1}, f_{2t}]$, and being adapted to use the at least one error polynomial produced by the one key equation determination device, $[f_1, f_2], [f_3, f_4]\ldots [f_{2t-1}, f_{2t}]$, to correct errors in the parallel data stream; Note: 515 and 516 in Figure 5 of Chen teach that the results of the Array Decoder in Figure 6 of Chen are used to correct errors in the parallel data stream).

35 U.S.C. 102(e) rejection of claims 2 and 3.

See Paper No. 5 for detailed action of prior rejections.

35 U.S.C. 102(e) rejection of claim 25.

Chen teaches the parallel data stream comprises a plurality of codewords (the incoming parallel data stream in Figure 6 of Chen comprises a plurality of codewords, one for each syndrome cycle and error corrects a single codeword of the plurality of codewords in the parallel data stream in each error correction cycle); and the decoder is adapted to route N symbols of a given codeword to a given N-parallel syndrome generator (in Figure 6 of Chen, the Syndrome Generators S_0-S_{2t} can be grouped in twos [S_1, S_2], [S_3, S_4]... [S_{2t-1}, S_{2t}] whereby each of the [S_{2k-1}, S_{2k}], as k ranges from 1 to t, is an N=2-parallel syndrome generator; hence Chen teaches t N=2-parallel syndrome generators; each of the N=2-parallel syndrome generators in Figure 6 of Chen is coupled to a parallel data stream corresponding to 2 input symbols for each N=2-parallel syndrome generator and is adapted to perform a calculation each Syndrome cycle with the N=2 symbols from the parallel data stream).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. Claims 4 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen, Yen-Hao (US 6571368 B1) in view of Yun, Young-Han (US 5526368 A).

35 U.S.C. 103(a) rejection of claims 4 and 6.

See Paper No. 5 for detailed action of prior rejections.

9. Claims 8, 9 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen, Yen-Hao (US 6571368 B1) in view of White, Philip E. (US 5754563 A).

35 U.S.C. 103(a) rejection of claims 8 and 9.

See Paper No. 5 for detailed action of prior rejections.

35 U.S.C. 103(a) rejection of claim 19.

Chen teaches a method comprising the steps of: converting a serial input data stream into a parallel data stream (col. 2, lines 45-50 in Chen teach the input to the syndrome generator is a serial input and Figure 6 of Chen teaches that the serial input is converted to a parallel data stream); performing a plurality of N-Parallel syndrome generations using the parallel data stream, each of the N parallel syndrome generations determining, after a predetermined number of cycles, a plurality of syndromes (in Figure 6 of Chen, the Syndrome Generators S_0-S_{2t} can be grouped in twos $[S_1, S_2]$, $[S_3, S_4]$...

$[S_{2t-1}, S_{2t}]$ whereby each of the $[S_{2k-1}, S_{2k}]$, as k ranges from 1 to t, is an N=2-parallel syndrome generator; hence Chen teaches t N=2-parallel syndrome generators; each of the N=2-parallel syndrome generators in Figure 6 of Chen is coupled to the parallel data stream corresponding to 2 input symbols for each N=2-parallel syndrome generator and is adapted to perform a calculation each Syndrome cycle with the N=2 symbols from the parallel data stream; each N=2-parallel syndrome generator in Figure 6 of Chen is used to determine, after a predetermined syndrome cycle, N=2 syndromes); performing, in parallel and by using each of the plurality of syndromes generated by each of the plurality of N-parallel syndrome generations, a plurality of N-parallel decodings of the parallel data stream to determine, in parallel, a plurality of error value and error locator polynomials (in Figure 6 of Chen, the key equation determination devices f_0-f_{2t} can be grouped in twos $[f_1, f_2]$, $[f_3, f_4]$... $[f_{2t-1}, f_{2t}]$ whereby each of the $[f_{2k-1}, f_{2k}]$, as k ranges from 1 to t, is a key equation determination device, see col. 9, lines 10-14 in Chen; Figure 6 of Chen teaches that each key equation determination device $[f_{2k-1}, f_{2k}]$, as k ranges from 1 to t, coupled to at least one of the corresponding N=2-parallel syndrome generators, $[S_{2k-1}, S_{2k}]$, as k ranges from 1 to t, and is adapted to determine at least one error polynomial by decoding a corresponding plurality of syndromes from the at least one N-parallel syndrome generator $[S_{2k-1}, S_{2k}]$; Note: col. 9, lines 10-14 in Chen teach that each key equation determination device $[f_{2k-1}, f_{2k}]$ generates error locator and error value polynomials); and correcting errors, by using a plurality of N-parallel correction and determination processes that use the error value and error locator polynomials, in the parallel data stream (in Figure 6 of Chen, row E:G, H and Ω_Λ can be grouped in

twos, {[g_1, g_2], [h_1, h_2], [ω_1, ω_2]}, {[g_3, g_4], [h_3, h_4], [ω_3, ω_4]}... {[g_{2t-1}, g_{2t}], [h_{2t-1}, h_{2t}], [ω_{2t-1}, ω_{2t}]}, whereby each of the {[g_{2k-1}, g_{2k}], [h_{2k-1}, h_{2k}], [ω_{2k-1}, ω_{2k}]}, as k ranges from 1 to t, is an N=2-parallel syndrome generator; hence Chen teaches t N=2-parallel error determination and correcting devices, one for each of the N-parallel syndrome generators, [S_1, S_2], [S_3, S_4]... [S_{2t-1}, S_{2t}], each N-parallel error correction and determination devices {[g_1, g_2], [h_1, h_2], [ω_1, ω_2]}, {[g_3, g_4], [h_3, h_4], [ω_3, ω_4]}... {[g_{2t-1}, g_{2t}], [h_{2t-1}, h_{2t}], [ω_{2t-1}, ω_{2t}]} coupled to one of the key equation determination devices, [f_1, f_2], [f_3, f_4]... [f_{2t-1}, f_{2t}], and being adapted to use the at least one error polynomial produced by the one key equation determination device, [f_1, f_2], [f_3, f_4]... [f_{2t-1}, f_{2t}], to correct errors in the parallel data stream; Note: 515 and 516 in Figure 5 of Chen teach that the results of the Array Decoder in Figure 6 of Chen are used to correct errors in the parallel data stream).

However Chen, does not explicitly teach the specific use of outputting a second parallel data stream comprising a corrected version of the parallel data stream, i.e., parallel correction of data.

The Examiner asserts that Chen teaches error correction circuitry for extracting key equation in parallel for use in error correction circuitry 515 in Figure 5 of Chen to create a data stream E(x) of correction values indicating a position in the second parallel data stream at which an error occurs. However, Chen does not teach that E(x) is a parallel data stream since the novelty in the Chen patent is the implementation of Error Correction Circuitry 511-515 in parallel. White on the other hand teaches the use of implementing a Most Likely Code Word Generator 308 in Figures 3, 7 and 7-A which

takes data from Error Correction Circuitry 511-515 as taught in the Chen patent in parallel whereby c(x) is a parallel data stream comprising corrected symbols and e(x) is a parallel stream of correction values, each bit in the parallel stream of correction values indicating a position in the second parallel data stream at which an error occurs. One of ordinary skill in the art at the time the invention was made would have been highly motivated to combine the teachings in the Chen patent with the teachings in White patent to achieve high speed circuitry throughout the required error correction processing in the Chen and White patents (see Abstract, White).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Chen with the teachings of White by including use of parallel correction of data. This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized that use of parallel correction of data would have provided the opportunity to achieve high speed circuitry throughout the required error correction processing in the Chen and white patents (see Abstract, White).

10. Claims 10-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen, Yen-Hao (US 6571368 B1) in view of Mastrovito (Mastrovito, "VLSI designs for multiplication over finite fields GF(2.sup.m)," Int'l Conf. on Applied Algebra, Algebraic Algorithms, and Error-Correcting Codes, 297-309, Rome, July 1988).

35 U.S.C. 103(a) rejection of claims 10-14.

See Paper No. 5 for detailed action of prior rejections.

Allowable Subject Matter

11. Claims 5 and 7 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an Examiner's statement of reasons for the indication of allowable subject matter:

The present invention pertains to a decoder comprising: a plurality of N-parallel syndrome generators, each N-parallel syndrome generator adapted to determine a plurality of syndromes; a plurality of key equation determination devices, each key equation determination device adapted to determine at least one error polynomial by using a corresponding plurality of syndromes from the at least one N-parallel syndrome generators; and a plurality of N-parallel error determination and correcting devices, one for each of the N-parallel syndrome generators, each N-parallel error correction and determination device adapted to use the at least one error polynomial produced by the one key equation determination device to correct errors in the parallel data stream.

Claim 5 recites various features:

"the device creates a parallel data stream having a width of 48 symbols, wherein the device outputs 48 symbols every clock cycle; N is three; there are 16 three-parallel syndrome generators, four key equation determination devices, and 16 three-parallel

error determination and detection devices, wherein each four of the three-parallel syndrome generators and three-parallel error determination and detection devices share one of the four key equation determination devices; and the decoder outputs a second parallel data stream having a width of 48 symbols, wherein the decoder outputs 48 symbols per clock cycle".

The Prior Art of record, and in particular, Chen teach a decoder comprising: a plurality of N-parallel syndrome generators (in Figure 6 of Chen, the Syndrome Generators S_0-S_{2t} can be grouped in twos $[S_1, S_2]$, $[S_3, S_4]\ldots [S_{2t-1}, S_{2t}]$ whereby each of the $[S_{2k-1}, S_{2k}]$, as k ranges from 1 to t, is an N=2-parallel syndrome generator; hence Chen teaches t N=2-parallel syndrome generators), each of the N-parallel syndrome generators coupled to a parallel data stream and being adapted to perform a calculation each cycle with N symbols from the parallel data stream (each of the N=2-parallel syndrome generators in Figure 6 of Chen is coupled to a parallel data stream corresponding to 2 input symbols for each N=2-parallel syndrome generator and is adapted to perform a calculation each Syndrome cycle with the N=2 symbols from the parallel data stream), each N-parallel syndrome generator adapted to determine, after a predetermined number of cycles, a plurality of syndromes (each N=2-parallel syndrome generator in Figure 6 of Chen is used to determine, after a predetermined syndrome cycle, N=2 syndromes), a plurality of key equation determination devices (in Figure 6 of Chen, the key equation determination devices f_0-f_{2t} can be grouped in twos $[f_1, f_2]$, $[f_3, f_4]\ldots [f_{2t-1}, f_{2t}]$ whereby each of the $[f_{2k-1}, f_{2k}]$, as k ranges from 1 to t, is a key equation determination device, see col. 9, lines 10-14 in Chen), each key equation determination device

coupled to at least one of the N-parallel syndrome generators and being adapted to determine at least one error polynomial by using a corresponding plurality of syndromes from the at least one N-parallel syndrome generators (Figure 6 of Chen teaches that each key equation determination device $[f_{2k-1}, f_{2k}]$, as k ranges from 1 to t, coupled to at least one of the corresponding N=2-parallel syndrome generators, $[S_{2k-1}, S_{2k}]$, as k ranges from 1 to t, and is adapted to determine at least one error polynomial by using a corresponding plurality of syndromes from the at least one N-parallel syndrome generator $[S_{2k-1}, S_{2k}]$; Note: col. 9, lines 10-14 in Chen teach that each key equation determination device $[f_{2k-1}, f_{2k}]$ generates error locator and error value polynomials) and a plurality of N-parallel error determination and correcting devices, one for each of the N-parallel syndrome generators, each N-parallel error correction and determination device coupled to one of the key equation determination devices and being adapted to use the at least one error polynomial produced by the one key equation determination device to correct errors in the parallel data stream (in Figure 6 of Chen, row E:G, H and Ω_Λ can be grouped in twos, $\{[g_1, g_2], [h_1, h_2], [\omega_1, \omega_2]\}$, $\{[g_3, g_4], [h_3, h_4], [\omega_3, \omega_4]\}\ldots \{[g_{2t-1}, g_{2t}], [h_{2t-1}, h_{2t}], [\omega_{2t-1}, \omega_{2t}]\}$, whereby each of the $\{[g_{2k-1}, g_{2k}], [h_{2k-1}, h_{2k}], [\omega_{2k-1}, \omega_{2k}]\}$, as k ranges from 1 to t, is an N=2-parallel syndrome generator; hence Chen teaches t N=2-parallel error determination and correcting devices, one for each of the N-parallel syndrome generators, $[S_1, S_2], [S_3, S_4]\ldots [S_{2t-1}, S_{2t}]$, each N-parallel error correction and determination devices $\{[g_1, g_2], [h_1, h_2], [\omega_1, \omega_2]\}$, $\{[g_3, g_4], [h_3, h_4], [\omega_3, \omega_4]\}\ldots \{[g_{2t-1}, g_{2t}], [h_{2t-1}, h_{2t}], [\omega_{2t-1}, \omega_{2t}]\}$ coupled to one of the key equation determination devices, $[f_1, f_2], [f_3, f_4]\ldots [f_{2t-1}, f_{2t}]$, and being adapted to use the at least one error polynomial produced

by the one key equation determination device, $[f_1, f_2]$, $[f_3, f_4]\ldots [f_{2t-1}, f_{2t}]$, to correct errors in the parallel data stream; Note: 515 and 516 in Figure 5 of Chen teach that the results of the Array Decoder in Figure 6 of Chen are used to correct errors in the parallel data stream).

The prior art however are not concerned with and do not teach, suggest, or otherwise render obvious a device that creates a parallel data stream having a width of 48 symbols, wherein the device outputs 48 symbols every clock cycle whereby N is three and there are 16 three-parallel syndrome generators, four key equation determination devices, and 16 three-parallel error determination and detection devices, wherein each four of the three-parallel syndrome generators and three-parallel error determination and detection devices share one of the four key equation determination devices and the decoder outputs a second parallel data stream having a width of 48 symbols, wherein the decoder outputs 48 symbols per clock cycle as taught by claim 5 and its base and intervening claims. Hence the prior art taken alone or in any combination fail to teach the claimed novel feature in claim 5 in view of its base and intervening claims.

Claim 7 recites various features:

"a device adapted to disable error correction of the decoder when the number of corrected bit errors for each of a predetermined number of frames is less than a first predetermined value and adapted to disable the decoder when a deployed forward error correcting code cannot be processed by the decoder".

The prior art are not concerned with and do not teach, suggest, or otherwise render obvious a device adapted to disable error correction of the decoder when the number of corrected bit errors for each of a predetermined number of frames is less than a first predetermined value and adapted to disable the decoder when a deployed forward error correcting code cannot be processed by the decoder as taught by claim 7 and its base and intervening claims. Hence the prior art taken alone or in any combination fail to teach the claimed novel feature in claim 7 in view of its base and intervening claims.

Conclusion

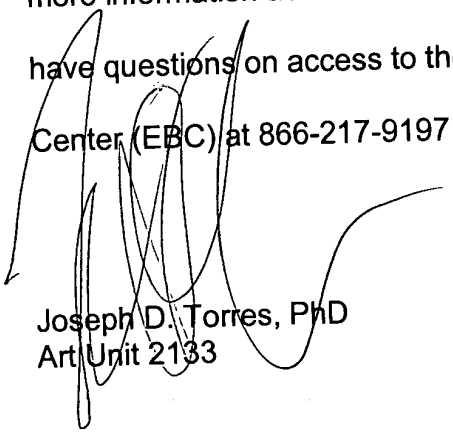
12. Although the Applicant's amendment did not require a new ground(s) of rejection, the amended language in claims 1 and 19 required the rewriting of the rejections to claims 1 and 19 to reflect newly amended language in claims 1 and 19. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph D. Torres whose telephone number is (703) 308-7066. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert Decady can be reached on (703) 305-9595. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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